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Proposal of a principle cum scale analytical framework for analyzing agroecological development projects

Diane Kapgen^a and Laurence Roudart^b

^aFaculty of Humanities, Education and Social Sciences, University of Luxembourg, Luxembourg;

^bFaculty of Philosophy and Social Sciences, Université Libre De Bruxelles, Brussels, Belgium

ABSTRACT

Because agroecology has different meanings, it may be used in an arbitrary and potentially abusive way when deployed by development cooperation actors conceiving “agroecology-based” development projects. To make the appropriation of agroecology more transparent, we first review the recent attempts in academia to clarify the concept and identify two main trends: a *principle-based* agroecology and a series of different agroecologies. Based on a critical assessment of these attempts, we then propose a new framework to program, implement and analyze agroecological development projects: it distinguishes different agroecologies with their corresponding categories of principles and their scales of intervention. Further, we argue in favor of a specific category of methodological principles.

KEYWORDS

Agroecology; development Projects; agroecological Principles; types of Agroecologies; scales of Intervention

Introduction

Since the late 1980s, agroecologically-based agricultural and rural development programs and projects have gained increasing importance in development cooperation, especially among NGOs (Altieri 2002; Pretty and Hine 2000). Development institutions often present agroecology as the long-awaited turnaround toward rural development programs with *sustainable* impact – based on the claim that it is built on smallholder farmers’ knowledge and existing livelihood assets, and that it is the only viable agricultural (and rural) development pathway available.

In the quest for enhancing smallholder farmers’ livelihoods, an increasing number of studies have been underlining the importance of a transition to alternative agricultural systems through “*an agroecological development paradigm*” (Altieri et al. 2012, Gliessman 2015; Pretty, Toulmin, and Williams 2011; Rosset and Martínez-Torres 2012, Wezel et al. 2014; IAASTD 2009; Altieri and Nicholls 2005; Pimbert. 2017). This especially concerns dozens of millions of African smallholder farmers, many of whom

cannot afford expensive technologies and inputs supplied by industries (Pretty 2007).

Studies concerned with evaluating the influences of agroecologically-based development projects show positive effects on yields, food production, ecological externalities and diversification, with increased total production of smallholder farming systems in marginal developing regions including the African continent (Pretty and Hine 2000; Pretty, Toulmin, and Williams 2011; Uphoff and Altieri 1999). Yet, at the same time, the focus of these studies reveals an “agroecological paradox”: while agroecological approaches have increasingly claimed to follow multi- and transdisciplinary, participatory and bottom-up, politically engaged and action-oriented approaches, many agroecological initiatives remain enclosed in agronomy and ecology (Van Dam and Stassart et al. 2012), where the improvement of smallholder farmers’ livelihoods is seen as based on ecologically sustainable food production increase above all, with the aim of preserving ecosystems for future generations. This situation echoes the opposition between the narrow versus large conceptions of agroecology (Méndez, Bacon, and Cohen 2013; Méndez et al. 2016).

Indeed, the term “agroecology” is used in various ways and “has come to mean many different things” (Hecht 1995, 4). This leads to different and arbitrary adoptions of the concept by development cooperation actors, like NGOs, governmental agencies, international institutions and others. In public and official discourse, it is not clear what is meant by phrases like “agroecological projects”, “agroecology for smallholder farmers”, “agroecology as a promising way to improve family farmers’ livelihoods” and so forth. As a matter of fact, development organizations face no obligation to explain their particular perspective on agroecology.

In the academic world, some scientists see the concept of agroecology as an orientation with a “polysemous” meaning (Stassart et al. 2012) and prone to confusion (Wezel et al. 2009). There are two main ongoing tendencies for adding both clarity and ease of operationalization to the agroecological concept. The first is an attempt to distinguish different *agroecologies*, and the second is an (*expanded*) *principle-based* agroecology. Both tendencies include a relatively harsh critique of the narrow approaches to agroecology and advocacy of inter- or transdisciplinary-based approaches to agroecology.

The objectives of this paper are twofold. First, it is to analyze in-depth the various components of these two endeavors to clarify what agroecology is (sections 2 and 3). Second, it is to produce a framework that integrates these two tendencies, so that the use of the agroecology concept may become clearer, especially when deployed in the development cooperation context (section 4).

Different types of agroecology

The narrow versus the large approach to agroecology

In order to clarify the field of agroecology, Méndez, Bacon, and Cohen (2013) identified two predominant perspectives of agroecology, figuring at opposite ends of a scale. The first perspective reflects the narrow approach of agroecology as a science: “[it] tends to exclusively apply agroecology as a framework to reinforce, expand or develop scientific research, firmly grounded in the western tradition and the natural sciences” (Méndez, Bacon, and Cohen 2013, 5). It is a purely hard scientific approach, including its objectivity and apolitical stance, and it has been crucial to the evolution of agroecology and the understanding of ecological processes in ecosystems, both natural and anthropogenic, and the interaction of agricultural production and the biophysical environment. Méndez et al. describe its main attributes as interdisciplinary [*natural sciences*], top-down, apolitical, recommendation-orientated, and aiming at the transformation of agricultural production.

By contrast, the second perspective is transdisciplinary, participatory and bottom-up, action-orientated, politically engaged and aims at the transformation of agro-food systems (Méndez, Bacon, and Cohen 2013, 7). This second perspective is also science-grounded but it combines natural sciences and social sciences. Furthermore, in transdisciplinary approaches, various types of knowledge are not only valued but actively integrated. This leads to a knowledge base composed of scientific and academic, local, indigenous, experimental and other forms of grasping and interpreting reality (Altieri 1983, Altieri et al. 2012, Scoones and Thompson 1994, 2009, Martínez-Torres and Rosset 2014; McCune, Reardon, and Rosset 2014). The knowledge creation process does not start or end with research but goes further and involves multiple actors as active participants. This approach has roots in critical development thinking, particularly in Latin America where Participatory Action-Research (PAR) has developed the most, in relation with the adult education movement initiated by Freire (1974). In PAR, the local people co-produce, together with and on par with scientific researchers, the knowledge about their condition and how to transform it. And they act accordingly, so as to improve their situation, based on their own values and capacities (Fals Borda 1987). In this sense, true to the pioneer thinkers who elaborated this concept, *participation* challenges the mainstream, western conception of Development. It proposes an alternative way of producing knowledge and truth, with a view to generate popular power (Escobar 1992). These ideas have been taken over by other critical development thinkers¹ and by agroecologists following this second perspective: the ultimate goal is a *transformation* of the existing food system, through critical analysis of – and action against – its economic and social structures, with a view to

build a more socially just and sustainable food system (Méndez et al. 2016, p. 8–9; Altieri et al. 2012).

Extending the large approach toward a political “transformative agroecology”

Some agroecologists have translated the large approach to agroecology into a self-contained approach called “Transformative Agroecology”, whose primary goal is the transformation of the present food system and, beyond that, of the relationships between humans on the one hand, between humans and the earth on the other hand (Giraldo and Rosset 2018).

According to this approach, agroecology as a science cannot be separated from its practice and politics: it is not neutral, but openly and avowedly political and tied to agrarian, environmental and other social movements, which it supports through research and advocacy. This conception has roots in critical social sciences and critical development studies but, like the transdisciplinarity mentioned above, it also relies on other ways of knowing, particularly on the knowledge accumulated during millennia by each people in each own context about their ecosystem, its evolution, management, functions and regeneration (Pimbert 2017).

Authors supporting transformative agroecology are very critical about the vision of agroecology which is reduced to a narrow set of techniques without addressing the issue of power structures, as it bears the risks of mere greenwashing or co-optation, that is false solutions to the multiple crises of the food system developed by mainstream organizations (LVC 2015). They consider that this vision is in line with the apolitical mainstream “food security” concept, as well as the Sustainable Development Goals and the prior Millenium Development Goals. They advocate a profound overhaul of a certain way that part of humans have of being to the world and of being in their relationships with others: this way is inspired by “capitalism, colonialism, standardization, industrialization, patriarchy, and other forms of injustice” (Ferguson et al. 2019) and, as it is dominant, it has catastrophic effects on the rest of humankind (Pimbert 2017); this should transform into a way of being inspired by solidarity, reciprocity, “autonomy, biocultural diversity, spirituality, and conviviality” (Ferguson et al. 2019).

In line with these values, transformative agroecology is fundamentally an emancipatory social change, initiated at the grassroots level by self-organized communities – of food producers, food eaters and otherwise concerned citizens –, based on their own analysis of their situation, without outside intervention by so-called “experts” or other external actors (Anderson et al. 2019).

However, the coexistence of varied local experiences may not result in the desired transformation at larger scales. This is why the issue of *scaling* has

become so prominent within transformative agroecology. Of course, scaling here is not to be understood as the mere transfer of agroecological practices, it is about “relationships, processes, policy, power, and practice that nurture social organization, learning, and adaptation” (Ferguson et al. 2019). It has become common to distinguish between *horizontal* scaling or *scaling out* – which is about the geographical and social spread of agroecology toward more farmers and communities –, and *vertical* scaling or *scaling up* – which is about the institutional spread of agroecological ideas and practices toward higher levels of decision-making, notably at the levels of policies and markets. Some authors distinguish a third dimension of scaling, namely *depth*, which concerns the adoption by farmers of more and more agroecological techniques, to the point of reshuffling entirely their farming systems (Brescia 2017). Mier and Giménez Cacho et al. (2018) identified eight key drivers of successful scaling, the overarching one being the rooting of processes in broad-based social movements, especially those led by peasants.

Within political agroecology, some authors think that it is possible to combine bottom-up and top-down action to expand agroecology.² This would require a change in the structure and in the functioning of the institutions governing the present food system, that could be based on a theory of action for agroecology-enabling public policies (González de Molina 2016). An example of such an approach is the ongoing work of IPES-Food, a panel of international experts on diverse topics regarding the food system: the panel advocates local food policy councils and a common food policy for the EU as political tools to implement a transition toward agroecology-based food systems (IPES Food 2015, 2019). Another example is the report of the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) that contains specific recommendations for policy-makers at different levels, with a view to orientate global agriculture toward agroecology.

The many types of agroecology and the persisting opacity of appropriation

Méndez, Bacon, and Cohen (2013), (2016)) claim that the many approaches to agroecology make it prone to confusion and favor the implementation of narrow approaches in the end. The two predominant perspectives they propose bring clarification but, at the same time, they obscure the lines separating the variants between them, as they themselves acknowledge (Méndez, Bacon, and Cohen 2013, 7). The two perspectives can thus only figure as two *ideal types* of agroecology, reflecting two opposite poles on a gradient of different agroecologies.

Furthermore, these two perspectives are grounded in agroecology as a science. Indeed, the authors view agroecology from a scholars’ point of view, even though they recognize that it is a scientific discipline, a social

movement and a patchwork of agricultural practices (Wezel et al. 2009). Therefore, they might miss approaches that are less connected to science. For example, many social rural movements supporting agroecology do not base themselves on scientific insight. Yet, they may publish studies that provide important, interesting or even pioneering ideas for advancing agroecology, like for example the development of agroecological principles by CIDSE,³ the collection and promotion of best practice examples by the LEISA magazine, and also the works by Groundswell International on scaling agroecology from the ground (Brescia 2017). Moreover, by contrasting the narrow perspective aimed at the transformation of agricultural production and the large perspective aimed at the transformation of agro-food systems, the authors implicitly suggest that approaches at the scale of the agroecosystem are natural science-grounded (even though interdisciplinary), top-down, apolitical and recommendation-orientated, while approaches at the scale of the food system are transdisciplinary, participatory and bottom-up, politically engaged and action-oriented.

In our view, the fundamental question is how to integrate effectively the attributes of the large perspective in all agroecological initiatives, no matter their scale of action. By using the term “effectively”, we wish to draw the attention on the fact that this large perspective refers to concepts – participation, bottom-up, transdisciplinarity, action-orientation – that are complex. Yet, it seems to us that much of the agroecological literature does not fully acknowledge this complexity, nor the criticisms addressed to these ideas based on decades of development praxis. In the case of participation for instance, its long history has shown how it often degrades into an empty shell in everyday development praxis. If agroecologists do not confront these issues, there is a risk that the concepts in question will remain poorly put into practice as part of an agroecological approach too.

In the end, the popularity of the term “agroecology” and the parallel coexistence of similar approaches⁴ make it especially prone to misuse for the pursuit of interests not in accordance with, or even in contrast to, the heart of the agroecological philosophy. Exemplarily, Giraldo and Rosset (2018) criticize the colonization of agroecology by development projects, especially the mere substitution of industrial chemical inputs by organic ones, which sustains the dependence of peasant vis-à-vis external suppliers. In our understanding, a core problem is the opaque appropriation of the concept of agroecology by different actors, especially in the development cooperation context. What is meant by an “agroecological” development project? In order to overcome this problem, a path might be to use a framework accounting for different agroecologies. However, even the different types of agroecologies are prone to misuse. This is why we propose to combine them with agroecological principles. In the next section, we

discuss these agroecological principles and then move on to proposing a combined framework.

Different sets of agroecological principles

In accordance with the rejection of a “one solution fits all” approach rooted in agroecological philosophy, and the parallel absence of an agreed-on working definition of “agroecology”, there have been efforts to develop and expand agroecological principles. For example, Stassart et al. (2012, 8) state that “a way to define agroecology while respecting its polysemous nature is to define its principles”,⁵ as it enables to specify the direction of agroecology, despite its various pathways. Several initiatives developed a set of agroecological principles, divided into several categories. To date, the most commonly used categories are: ecological, socioeconomic, and methodological. All the initiatives do not necessarily use all these categories and most use ecological principles as a core category. It should be noted that agroecological principles are not to be interpreted as rules, but rather as guidelines to put agroecology into action. Depending on who formulated them, principles may be more or less value-laden or strategic: they are more so when developed by non-governmental organizations or when attached to claims related to *just* food systems (e.g. CIDSE 2018).⁶ We now turn to examine more closely the main sets of principles found in the literature and their characteristics. We then discuss some difficulties in defining and using an agreed set of principles.

The evolution of the different principles in the literature

The initial ecological principles

The importance given to ecological principles can be explained by the fact that they are the most established and agreed – they are indeed sometimes referred to as “historical principles” (see Annex 1). They first appeared in the second edition of the landmark publication “*Agroecology. The Science of Sustainable Agriculture*” by Altieri in 1995. However, while this was their first occurrence in an explicitly agroecological publication, these five principles had been developed already in the publication “*Farming for the Future. An Introduction to Low-External-Input and Sustainable Agriculture*” by Reijntjes, Haverkort and Waters-Bayer in 1992, which had been co-published by the Center for learning on sustainable agriculture – ILEIA network. The latter work offers a guide to action in sustainable agriculture for and with small-holder farmers in developing regions. The authors explain that “these principles can be applied by way of various techniques and strategies”, in harmony with the given local context. Stassart et al. (2012) further point to the fact that some of these principles can be used in conventional agriculture as well. Their true and agroecological value lies in their combined use or

implementation because they then act upon the entire agroecosystem and do not isolate single elements.

Adding the principle of agrobiodiversity

Stassart et al. (2012) adopted the five ecological principles in a reformulated version and added a sixth one that states: “Value agrobiodiversity as an entry point for the redesign of food systems that ensure peasant autonomy and food sovereignty”. They refer to the Department “Science for Action and Development” (SAD) of the French National Agricultural Research Institute (INRA) (Tichit and Bellon et al. 2010) and the works of Machado and Santili et al. (2008) as well as Jackson and Rosenstock (2009) for the development of this “agrobiodiversity-principle”. It extends the functional diversity included in the original fifth principle – that focuses on the complementarity and synergy in the use of genetic resources – into a broader approach, that takes into account the diversity of species and of ecosystems.

Borrowing from sustainable agriculture to expand agroecological principles

Agroecologists often refer to works on sustainable agriculture in establishing agroecology’s principles (and vice versa, principles of sustainable agriculture may be based on works by agroecologists). A good reference for principles of sustainable agriculture – and that outlines similarities to agroecology – is provided by Koohafkan, Altieri, and Holt-Giménez (2012): in this article about what they call “Green Agriculture”, the authors define ten basic principles of sustainable agriculture (see Annex 2).

The authors explain three features of these principles. Firstly, they must guarantee that farming techniques do not drive an agricultural system beyond an environmental tipping point. Secondly, they must lead rural communities toward food, energy and technological sovereignty. Thirdly, the principles are locally adaptable and flexible because of the “diversity of ecological, socioeconomic, historical and political contexts” in which agriculture is evolving (Koohafkan, Altieri, and Holt-Giménez 2012, 1). These three features show clear parallels with agroecology.

These similarities also mean that it is difficult to delimit agroecological principles from principles of sustainable agriculture more generally. Depending on the agroecological approach (*i.e.* narrow or large), agroecological principles may be a part of the principles presented in Annex 2 or they may outreach them. Thus, it would be wise to either explicitly attest the agroecological principles’ commonalities with other sets of principles related to sustainable agriculture or, on the contrary, elaborate clear boundaries. In the attempts to expand agroecological principles beyond ecological principles, these clarifications are not provided. We discuss hereunder four of these attempts.

Expanding the agroecological principles beyond the ecological category

Considering critiques of narrower approaches, several authors have tried to establish more all-encompassing principles of agroecology. A major initiative has been taken by the Community Agroecology Network (CAN) – directed by Stephen Gliessman – which provides a studied, thoughtful and complete set of principles that reflect the large perspective of the later agroecological approaches (see [Annex 3](#)).⁷ CAN’s list reflects the different categories we mentioned earlier – ecological, socioeconomic and methodological principles – without explicitly referring to them. Indeed, the list mixes the different categories, which has the advantage of implicitly pointing to the interconnectedness of the different categories. On the other hand, this approach lacks structure, which might be a difficulty when implementers of agroecology deploy the principles in practice.

Other authors have followed the path of extending the *categories* of agroecological principles. Stassart et al. (2012, 10) added methodological and socioeconomic principles (see [Annex 4](#)) to the historical principles,⁸ with the aim of providing a holistic approach to a principle-based agroecology, defined as an interdisciplinary study of the ecology of food systems. However, in our view, their categorization lacks clarity: we acknowledge that it is not possible to establish clear boundaries between the different categories because they logically overlap in a system’s approach to agroecology but it is not evident why the authors attributed some of the principles to one category and not to another. More precisely, some of the “methodological principles” by Stassart et al. rather reflect ecological aspects (especially principles 8 and 9), whereas some of their “socioeconomic principles” reflect methodological aspects (especially principles 11 and 13). For example, the authors classify under “methodological principles” the claim “favour the construction of participatory research frameworks, which allow for action-oriented research while guaranteeing its scientific validity (...)”, and under “socioeconomic principles” the claim “create knowledge and a collective capacity to adapt, through networks comprising producers, citizen-consumers, researchers and state-funded technical advisers (...)”. Yet both these principles seem to reflect the aspect of how actors interact to implement agroecology.

Furthermore, Stassart himself and colleagues recently criticized the Stassart et al.’s “socioeconomic principles” as being based on literature review solely, instead of being refined through genuine field research-based findings (Dumont et al. 2016).⁹ More broadly, they criticize the absence of a clear definition of socioeconomic principles in much of the agroecological literature. The authors draw from four fields of study they consider close to agroecology (“alternatives to conventional agriculture, fair trade, the cooperative movement, and the social and solidarity economy movement”) to highlight key differences between agroecology and the other four areas, and they then extract a list of socioeconomic principles. Next, in a case study

based on several agroecological initiatives in Belgium, they test which of these principles were implemented in practice, to finally develop a list of socioeconomic principles they consider as crucial for agroecology (see [Annex 5](#)). This set of principles both refines and extends prior ones – for example, the list is far more exhaustive than the one by Stassart et al. (2012) by more accurately carving out aspects related to short food supply chains and producer-consumer relations.

Yet, Dumont et al. also include methodological principles in their list of socioeconomic principles (especially principles 5, 12 and 13), which ultimately blurs the distinctive status of agroecology’s methodological aspects. In our view, methodological principles should form a category on its own (see [section 4](#)).

Recently, the FAO published a new approach to agroecological principles, called “The 10 Elements of Agroecology” (FAO 2018a) (see [Annex 6](#)). The elements are derived from scientific literature – especially from Altieri’s five ecological principles (Altieri 1995) and Gliessman’s guide to transition to sustainable food systems (Gliessman 2015) – and complemented by findings from multi-actor regional workshops. In our view, the FAO’s 10 elements are an effort to provide a synthetic and generally agreeable set of principles. This entails that most elements reflect broad concepts – like “synergies”, “efficiency” or “responsible governance” –, which provide much scope for interpretation.¹⁰

It should be noted that several other institutions as well as non-governmental organizations have developed recently sets of agroecological principles. For example, the High Level Panel of Experts on Food Security and Nutrition (HLPE 2019) has built on the work of the FAO and others to produce a more condensed, minimalist list of thirteen principles. In the context of NGOs, the work by the CIDSE (2018), which builds on agroecological literature, stands out because it integrates four categories of principles: environmental, social and cultural, economic, political. This political dimension is essential in regard with the transformative objectives of some agroecologies.

Difficulties in defining and using an agreed set of principles

Agroecological principles can be found in most works of influential agroecologists, as well as in many agroecological studies in general. Sometimes the principles are not provided in the form of specific lists but rather “hide” in the arguments developed in a continuous text, as is the case for Stephen Gliessman’s famous book “*Agroecology: The Ecology of Sustainable Food Systems*” (Gliessman 2015). However, there is a general problem in attempts to define agroecological principles: some attempts are too open to interpretation (like in the case of FAO); others are too detailed because they stem from

context-specific case studies (like in the case of Dumont et al. 2016). This may explain why the principle-based approach – though repeatedly used, modified, and rewritten – has not found its way more systematically into planning, managing and evaluating agroecological projects. In the following, we try to identify some of the key hurdles to attempts to define and use an agreed-on principle-based agroecology.

The multiplicity of actors and of implementation-levels

A problem hindering the deployment of a principle-based agroecology in the development cooperation context lies in the different implementation-levels and the multiplicity of actors involved. For example, the approach to developing and disseminating new farming techniques and related consideration of traditional knowledge is not so much decided by the individual farmer, but often lies in the hands of more powerful, decision-making actors, like NGOs, governments and donors. Other example, in the case of the creation of greater autonomy from global markets, higher level decision-makers play a crucial role in providing an environment that supports such a process, thus effectively enabling farmers to choose the road they want to take. In the end, “farmers alone cannot transform the entire food system” (Gliessman 2011, 823). These examples point to an issue of scale, both vertically and horizontally. Each given principle *always* entails (and demands) different actions from a multitude of actors, both at different levels and at the same level. However, principle-based approaches mostly remain silent about cross-scale and within-scale interactions. Yet, potential positive impacts of agroecology might be compromised when the principles are implemented solely by actors operating at one specific level, as is the case when an agroecological project is planned by a development institution single-handedly and implemented *upon* a “beneficiary” population, rather than being a multi-level project that includes all actors from the beginning. In addition, the appropriation of the principles may be partial or biased.¹¹ Agroecology may be appropriated also by a limited group of actors operating at one hierarchical scale, thus excluding other people concerned at this scale, as is the case when more powerful farmers reap the benefits of an agroecological project and leave their less advantaged peers behind. Therefore, it might be wise to integrate these scale aspects in a principle-based agroecology.

Different categories of agroecological principles as an inseparable system

A far greater impediment to a principle-based approach is that the ecological principles alone enjoy general acceptance, while socioeconomic and methodological principles do not. This means that any actor picks the principles that best suits her/him, rather than implements them as an inseparable, coherent entity. While this is compatible with the narrow vision of agroecology, it is not compatible with the large one, according to which the *combined*

compliance with ecological, socioeconomic, methodological and even political principles is key. This distinction is especially important in the rural development cooperation context where externally-led, top-down approaches, “boxed” in natural sciences and void of social, cultural or methodological considerations, have long been criticized for not leading to desirable and sustainable development from the viewpoint of local populations (e.g. Chambers 1983; Altieri 1983, 1989).

Proposal of a framework to design, assess, monitor and evaluate agroecological projects

In spite of the difficulties mentioned above, we argue that an inventory of agroecological principles can provide foundation for both research and action. Of course, the principles should not be interpreted as transferable from theory to practice without adaptation and specification according to varied and evolving local contexts: as Bell and Bellon (2018, 608) put it, “the essential vision of agroecology (...) is to think contextually” and agroecological principles, although general, have to be context sensitive as any phenomenon has at least a slightly different manifestation according to its context. In this regard, the advantage of principles over indicators and thresholds is that they are more flexible (Dumont et al. 2016) and they may be tailored to the analysis of locally-adapted agroecological projects.

A negotiated and agreed-upon set of principles could provide a framework within which to assess and compare agroecological experiences (at least for those agreeing on the principles), and also to evaluate their effects, meaning that agroecological projects could better be held responsible for their impact. Knowing which principles have been adopted, how they have been interpreted and implemented and by whom, can help in retracing the decision-making process, and evaluating the “degree of agroecology” met by a given project. This seems crucial in the development cooperation context, where power differences between actors at the highest decision-making level and actors at the lowest implementing level are especially pronounced. This is why we concentrate hereunder on a set of principles meant for this context, knowing that a set of principles meant for another context (agriculture in rich countries for instance) would have nevertheless many common principles with the set proposed here.

A new categorization of agroecological principles with a methodological category at its core

Based on the above discussion, we use four categories of principles: ecological, socioeconomic, political and methodological. In our view, this willingly separate category of methodological principles is fundamental in the

development cooperation context. They concern *who* designs, implements, and controls agroecological development projects and *how* they are assessed, implemented, and evaluated. In our understanding, the large vision of agroecology cannot be true in valuing traditional knowledge, in rejecting the transfer-of-technology approach, and in enabling participatory approaches if methodological principles do not form the spearhead of agroecological initiatives in this context. Indeed, it is through the operationalization of the methodological principles that the attributes of the larger approach to agroecology may be really implemented. By incorporating some of these methodological aspects loosely in socioeconomic principles (e.g. Dumont et al. 2016), or by mixing ecological and other aspects into a category called “methodological principles” (e.g. Stassart et al. 2012), the peculiarity of methodological principles is diminished. Yet, without accepted and applied methodological principles, agroecology risks to be just another empty shell, sounding well and seeming to have learnt from experience of decades of critical development studies, but ultimately not changing the way “development business” is done.¹²

A multidimensional grid of agroecologies to analyze agroecological development projects

The two pre-discussed tendencies for developing the agroecological concept – *i.e.* the (expanded) principle-based agroecology on the one hand and the attempt to distinguish different agroecologies on the other hand – can be merged to develop a multidimensional grid of agroecologies, with their scale of action and their respective principles (see Figure 1). In the following, we present this integrative grid and discuss its potential contribution to *clarify* the agroecological concept, to render its use *less arbitrary* – especially when

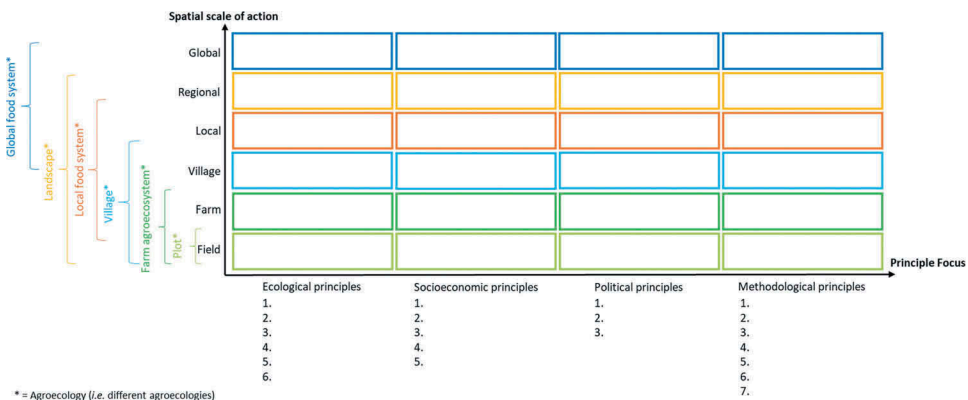


Figure 1. Different agroecologies, their scales of action and their inclusion of the different agroecological principles.

deployed in the development cooperation context – and to favor its transformative potential.

Presentation of the grid

In [Figure 1](#), each type of agroecology is defined by two criteria: its *scale of action* and its *principles*. The *vertical axis* deals with the *scale of action*. We distinguish six *main* spatial scales of action – from the field level at the bottom to the global level at the top – with the farm, village, local, and regional levels in-between. However, agroecological actions may include more than one scale. This is why we introduce on the left six agroecologies – from plot agroecology at the bottom to global food system agroecology at the top – with their respective *range* of action, displayed by the colored brackets. For example, “local food system agroecology” has its main scale of action at the local level but actions can range to include the field level or the regional level.

The *horizontal axis* deals with the agroecological principles. The four categories of principles with their respective number of principles are shown along the horizontal axis, from the ecological category on the left to the methodological category on the right. Beneath each category, the grid indicates numbers that refer to the *single* principles developed in [Table 1](#). This table is thus an extension of the grid.

The grid thus allows for positioning each agroecological development project according to its *scale of action* and its *principle focus*. With the grid, development project implementers indicate the scales of action of their project (at the height of its main scale of action) and use the rectangles for indicating the numbers of the principles of each category which they (intend to) put into practice. For example, a development project that has its main scale of action at the local level – with a range of action that can extend to the field level at the bottom and the regional level above – will use the four orange rectangles for indicating the numbers of the principles deployed in this project.

Discussion of the contribution of the proposed framework to adding clarity, preventing misuse and favoring the transformative potential of agroecology

By proposing this framework, we start from the observation that in the current world of development cooperation, more and more projects are undertaken in the name of agroecology. But, as a matter of fact, these projects reflect very varied conceptions of agroecology, some of which even falling under a real misappropriation of what is at the heart of the philosophy of agroecology (Kapgen 2019). From another point of view, we are well aware that agroecology and mainstream development cooperation may appear as antagonistic worlds, as the latter promotes interventions impulse by external actors with their own interests, and not fully autonomous actions by the

Table 1. A coherent set of agroecological principles for the development for development projects

Ecological Principles	Socioeconomic Principles	Political Principles	Methodological Principles
(1) Nurture soil conditions for optimal plant growth, particularly by managing organic matter and enhancing soil life.	(1) Build social equity among all stakeholders, both at the same hierarchical level and between levels	(1) Support collective agroecological action at local scales	(1) Use a transdisciplinary approach
(2) Recycle biomass for optimizing both energy flows and nutrient cycling and availability.	(2) Ensure market access and autonomy (avoid dependence from single crops or products, use alternative markets, favor local producer-consumer cycles)	(2) Promote institutional change for agroecology-enabling public policies at all levels	(2) Use farmer participation and explain how ¹³
(3) Minimize losses of energy, nutrients, soil and water through microclimate management, water management and erosion control in space and time	(3) Strengthen communities and local networks	(3) Adopt a politically engaged position	(3) Empower people so that they can control their development process
(4) Diversify flora and fauna of the agroecosystem and natural habitats in time and space	(4) Build financial independence by avoiding dependence from external subsidies and controlling		(4) Use bottom-up approaches, explain how, and enhance scale interaction
(5) Manage ecological relationships by reestablishing natural ecological relationships and allowing for beneficial interactions and biological synergies between components of agrobiodiversity	(5) Use and enhance local human, social and physical resources		(5) Use action-oriented approaches and explain how
(6) Adjust local environments by adapting biota and matching cropping and livestock systems to the productive potential and physical limitations of the farm landscape			(6) Use long-term flexible development strategies
			(7) Use a multi-directional transfer of knowledge

peoples themselves (Giraldo and Rosset 2018). However, there is little doubt that development cooperation will continue its activities for many years to come. Furthermore, we think that it includes professionals who sincerely wish to promote agroecology in its large conception. This is why we propose this framework as an instrument to support negotiations between the various stakeholders involved in any cooperation project labeled as “agroecological”, in the first place the “beneficiary” populations, in all their diversity. This instrument is meant for identifying, analyzing, discussing and challenging so-called agroecological projects.

Indeed, the framework may serve to clarify the use of the label “agroecology” by development cooperation actors: by having to use the grid, they would be pushed to answer questions about the scale of action and, probably more painfully, about the principles they consider. Let us take the example of methodological principles. The project promoter would have to answer four questions: First, is the category of methodological principles included in the agroecological development project? Second, which of the methodological principles are included? Third, how are these respective principles implemented? Fourth, in the case that not all principles are included, why are some of them excluded? The third question is the most fundamental because it serves to make more transparent the appropriation of the key concepts underlying the methodological principles, namely: transdisciplinarity, participation, empowerment, bottom-up, action-oriented, multidirectional transfer of knowledge. The most transparent possible use of key concepts behind the methodological principles is of utmost importance. For example, horizontal, constructivist pedagogies such as *campesino-a-campesino* (CAC) approaches have proven to be effective as tools of multidirectional transfer of knowledge (Brescia 2017). Yet, they do not necessarily take into account power structures at the micro-level. Indeed, in agroecological discourse by NGOs, smallholder farmers are often depicted as a homogenous category (only differentiated by gender), when in reality their societies are highly complex, with hierarchical structures. In this situation, it is not clear *which* farmers can actually and truly participate in horizontal exchanges of knowledge: Are traditional leaders given priority access or can the most deprived participate equally? This kind of indication and explanation would have to be done for each single principle of each category.

This is how the filling of the grid could support a discussion about the project between all stakeholders, at various stages: design, monitoring, evaluation. In this way, more transparency would help to prevent misuse as, for the project promoter, answering positively to the inclusion of one principle, and explaining how it would be implemented, would be equivalent to making commitments vis-à-vis the other stakeholders in the project. Again, this could give rise to discussions or objections in case of noncompliance.

Of course, the proposed framework will not bring agroecology to scale *per se*. However, it seems to us that by giving an instrument for a critical analysis of the appropriation of agroecology in the development cooperation context, an instrument that may be used and shared by the different stakeholders in a project, it may contribute to the transformation agenda of agroecology.

Conclusion

In this article, we showed the manifold interpretations of agroecology. We proposed a set of agroecological principles distributed over four categories for the development cooperation context, as well as a matrix of *agroecologies*, each type of agroecology being characterized by its scale of action and the degree of inclusion of the various principles.

The necessity of the proposed Principle cum Scale Analytical Framework results from the diffused image of agroecology in development discourses, which is grounded in what we call the “agroecological paradox” in the development cooperation context. As an ideal theoretical construct, which is often referred to in discourses, agroecology is a transdisciplinary, participatory, bottom-up and action-oriented approach, based on the improvement of (local) traditional farming techniques designed *with* smallholder farmers as equals and experts, building on and reinforcing locally available natural, human, social and physical assets, enhancing political-economic empowerment and social equity, justness and integration. In development practice, however, the agroecological approach chosen depends on the vision and the “goodwill” of the implementing development actor(s). Thus, agroecology in a development intervention might just as well designate a monodisciplinary, non-participatory, laboratory- or field- trials based development of farming techniques and their top-down diffusion. As a result, there is a potential danger of a decay of agroecology into “just another top-down technical package”, especially when the focus is reduced to ecological aspects. Agroecology might accordingly lose its proclaimed transformative potential in development practice. In our analysis of agroecology in a development cooperation context, we finally conclude that it is of utmost importance that development-implementing actors make their vision of agroecology and the resulting development offer more transparent. The here-proposed grid of *agroecologies* and its attached list of agroecological principles for the development cooperation context might provide a useful frame for that.

Notes

1. see exemplarily the works from Robert Chambers.
2. In our view, reformist rather than radical political agroecologists are of this persuasion.
3. CIDSE is an umbrella organization for Catholic development agencies, and acronym for *Coopération Internationale pour le Développement et la Solidarité*.

4. Coexistent approaches are for example: Sustainable Agriculture, Diversified Farming Systems, Conservation Agriculture, Agroecology-based Aggradation-Conservation Agriculture, Organic Agriculture, Low-External-Input and Sustainable Agriculture (LEISA), Permaculture.
5. Translated from French original.
6. Value-laden is not pejorative here; on the contrary, agroecology is a value-based concept (cf. for example the discussions about the immaterial territory of agroecology by Rosset and Martínez-Torres 2012, and by; Giraldo and Rosset 2018).
7. This list of principles was published online only, on the former CAN website.
8. Cf. section “Adding the principle of agrobiodiversity”.
9. In our view, Dumont et al. may miss a point in this critique: even though Stassart et al.’s list is not directly derived from field research insight, the literature they draw upon certainly is.
10. This scope for interpretation is lessened by the FAO’s endeavor to relate agroecology to the targets and respective indicators of the single SDGs (Cf. FAO 2018b).
11. This is well illustrated in the report evaluating 15 years of actions by the *Agence française de développement* to support agroecology and the French Facility for Global Environment: this report shows that agroecology was reduced to Direct Seeding and Mulch-based Cropping (cf. Levard et al. 2014).
12. For example, in a development project, external experts (like researchers) may develop a package of new agroecological farming techniques based on ecological principles. This package is then diffused to farmers with a transfer-of-technology approach. In such a situation, the ecological principles of agroecology are respected, whereas the methodological principles are not: the transfer-of-technology approach is in contradiction to them.
13. Note on the indications “explain how” in the table: the “implementer” of these principles must explain what he/she understands by “participation”, “bottom-up” and “action-oriented” in order to avoid that these key concepts are used as empty attributes rather than acknowledging their complexity and the lessons already learned in development research and praxis.

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Annex 1

The original set of ecological principles by Reijntjes, Haverkort, and Waters-Bayer (1992)

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- (1) Securing favorable soil conditions for plant growth, particularly by managing organic matter and enhancing soil life.
 - (2) Optimizing nutrient availability and balancing nutrient flow, particularly by means of nitrogen fixation, nutrient pumping, recycling and complementary use of external fertilizers.
 - (3) Minimizing losses due to flows of solar radiation, air and water by way of microclimate management, water management and erosion control.
 - (4) Minimizing losses due to plant and animal pests and diseases by means of prevention and safe treatment.
 - (5) Exploiting complementarity and synergy in the use of genetic resources, which involves combining these in integrated farm systems with a high degree of functional diversity.
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Annex 2

(Sustainable Agricultural Systems) Principles by Koohafkan, Altieri, and Holt-Giménez (2012)

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- (1) Use of local and improved crop varieties and livestock breeds so as to enhance genetic diversity and enhance adaptation to changing biotic and environmental conditions
 - (2) Avoid the unnecessary use of agrochemical and other technologies that adversely impact on the environment and on human health (e.g. heavy machineries, transgenic crops, etc.)
 - (3) Efficient use of resources (nutrients, water, energy, etc.), reduced use of nonrenewable energy and reduced farmer dependence on external inputs
 - (4) Harness agroecological principals and processes such as nutrient cycling, biological nitrogen fixation, allelopathy, biological control via promotion of diversified farming systems and harnessing functional biodiversity
 - (5) Making productive use of human capital in the form of traditional and modern scientific knowledge and skills to innovate and the use of social capital through recognition of cultural identity, participatory methods and farmer networks to enhance solidarity and exchange of innovations and technologies to resolve problems
 - (6) Reduce the ecological footprint of production, distribution and consumption practices, thereby minimizing GHG emissions and soil and water pollution
 - (7) Promoting practices that enhance clean water availability, carbon sequestration, conservation of biodiversity, soil and water conservation, etc.
 - (8) Enhanced adaptive capacity based on the premise that the key to coping with rapid and unforeseeable change is to strengthen the ability to adequately respond to change to sustain a balance between long-term adaptability and short-term efficiency
 - (9) Strengthen adaptive capacity and resilience of the farming system by maintaining agroecosystem diversity, which not only allows various responses to change, but also ensures key functions on the farm
 - (10) Recognition and dynamic conservation of agricultural heritage systems that allows social cohesion and a sense of pride and promote a sense of belonging and reduce migration.
-

Annex 3

Agroecological Principles by Community Agroecology Network (CAN)

- (1) Use renewable resources. Use renewable sources of energy instead of nonrenewable resources; Use biological nitrogen fixation; Use naturally-occurring materials instead of synthetic, manufactured inputs; Use on-farm resources as much as possible; Recycle on-farm nutrients
 - (2) Minimize toxics. Reduce or eliminate the use of materials that have the potential to harm the environment or the health of farmers, farm workers, or consumers. Use farming practices that reduce or eliminate environmental pollution with nitrates, toxic gases, or other materials generated by burning or overloading agroecosystems with nutrients.
 - (3) Conserve resources. Conserve soil (Sustain soil nutrient and organic matter stocks; Minimize erosion by using perennials, using no-till or reduced tillage methods, mulching); Conserve water (Dry farm; Use efficient irrigation systems); Conserve energy (Use energy efficient technologies); Conserve genetic resources (Save seed; Maintain local land races; Use heirloom varieties); Conserve capital (Keep bank debt to a minimum; Reduce expenditures)
 - (4) Manage ecological relationships. Reestablish ecological relationships that can occur naturally on the farm instead of reducing and simplifying them; Manage pest, diseases, and weeds instead of “controlling” them; Use intercropping and cover cropping; Integrate livestock; Enhance beneficial biota (1. In soils through mycorrhizae, rhizobia, free-living nitrogen fixers. 2. Beneficial insects through providing refugia for beneficials, enhancing beneficial populations by breed and release programs); Recycle nutrients (Shift from throughflow nutrient management to recycling of nutrients, return crop residues and manures to soils, when outside inputs are necessary, sustain their benefits by recycling them); Minimize disturbance (Use reduced tillage or no-till methods, use mulches, use perennials).
 - (5) Adjust to local environments. Match cropping patterns to the productive potential and physical limitations of the farm landscape; Adapt biota (adapt plants and animals to the ecological conditions of the farm rather than modifying the farm to the needs of the crops and animals)
 - (6) Diversify. Landscapes (Maintain undisturbed areas as buffer zones; use contour and strip tillage; Maintain riparian buffer zones; Use rotational grazing). Biota (Intercrop; Rotate crops; Use polyculture; Integrate animals in system; Use multiple species of crops and animals on farm; Use multiple varieties and landraces of crops and animals on farm). Economics (Avoid dependence on single crops/products; Use alternative markets; Organic markets; Community Supported Agriculture; “Pick your own” marketing; Add value to agricultural products; Process foods before selling them; Find alternative incomes; Agrotourism; Avoid dependence on external subsidies; Use multiple crops to diversify seasonal timing of production over the year).
 - (7) Empower people. Ensure that local people control their development process; Use indigenous knowledge; Promote multi-directional transfer of knowledge, as opposed to “top-down” knowledge transfer (Teach experts and farmers to share knowledge not “impose” it); Engage in people-centric development; Increase farmer participation (Link farmers with consumers); Strengthen communities (Encourage local partnerships between people and development groups. Ensure intergenerational fairness); Guarantee agricultural labor (Ensure equitable labor relations for farm workers); Teach principles of agroecology and sustainability.
 - (8) Manage whole systems. Use planning processes that recognize the different scales of agroecosystems (landscapes, households, farms, communities, bioregions, nations); Minimize impacts on neighboring ecosystems
 - (9) Maximize long-term benefits. Maximize intergenerational benefits, not just annual profits; Maximize livelihoods and quality of life in rural areas; Facilitate generational transfers; Use long-term strategies (develop plans that can be adjusted and reevaluated through time); Incorporate long-term sustainability into overall agroecosystem design and management; Build soil fertility over the long-term (build soil organic matter).
 - (10) Value health. Human health; Cultural health; Environmental health (Value most highly the overall health of agroecosystems rather than the outcome of a particular crop system or season; Eliminate environmental pollution by toxics and surplus nutrients); Animal health; Plant health.
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Annex 4

Agroecological Principles by Stassart et al. (2012)

A. Historical principles of agroecology (from Reijntjes, Haverkort, and Waters-Bayer (1992) in Altieri (1995))

- (1) Recycle biomass as much as possible, so as to optimize both energy flows and nutrient cycling and availability.
- (2) Nurture soil conditions for optimal plant growth, with a keen eye on organic matter and soil life management. Because of the antagonisms with oil-based external inputs and because fossil fuel is going to be outphased anytime soon, this nurturing should be conceived minimizing the use of petrochemicals (fertilizer, pesticides, fossil fuels).
- (3) Minimize resource losses (e.g. energy, nutrients, water and soil) through microclimate management, water harvesting techniques in drylands, increasing soil cover in space and time and the interplay of territorial specificities, especially through mixed farming systems.
- (4) Favor genetic diversification of agroecosystems, both within and between species, in space and in time.
- (5) Allow for beneficial interactions and biological synergies between components of agrobiodiversity so as to strengthen the above-mentioned key processes and services.
- (6) Value agrobiodiversity as an entry point for the redesign of food systems that ensure peasant autonomy and food sovereignty (Machado and Santili et al. 2008; Jackson and Rosenstock 2009).

B. Methodological principles from Science in Action Department (SAD), INRA (Tichit and Bellon et al. 2010)

- (7) Develop multi-criteria guidance of agroecosystems within a long-term transition perspective, taking into account trade-offs between long term and short-term benefits, and giving due importance to properties that increase resilience and adaptability.
- (8) Value spatio-temporal resource variation: exploit local resources when and where they are available rather than trying to get rid of intrinsic variation.
- (9) Stimulate the exploration of agroecosystems far removed from the already known local optima of today (Weiner, Andersen et al. 2010), e.g. « extreme » systems with very low levels of external inputs both in animal and plant production (Jackson 2002).

B. Methodological principles (from GIRAF)

- (10) Favor the construction of participatory research frameworks, which allow for action-oriented research while guaranteeing its scientific validity (Hatchuel 2000; Hubert 2002). Designing sustainable food systems is indeed complex because it requires researchers to take into account stakeholder interdependencies and ambiguities as well as the socio-economic uncertainties of technical innovations (Bell and Bellon 2018).

C. Socio-economic principles (GIRAF)

- (11) Create knowledge and a collective capacity to adapt, through networks comprising producers, citizen-consumers, researchers and state-funded technical advisers. These networks promote decision-making fora, public debate and the diffusion of knowledge (Thompson 1997; Pimbert, Boukary et al. 2011).
 - (12) Foster opportunities for peasants to evolve toward greater autonomy with regard to dominant (world) market forces. This fostering happens through the creation of enabling environments for public goods and the development of practices and socio-economic models that strengthen the democratic governance of food issues. Systems would then be (re)localized and co-managed by both producers and citizen-consumers (Ploeg and der 2008; Wittman, Desmarais et al. 2010).
 - (13) Value the diversity of forms of knowledge: local know-how (Hassanein and Kloppenburg 1995) or Indigenous Technology and Knowledge (ITK, Richards 1993) or empirical knowledge (Wynne 1996), both while constructing problems and the audiences these problems address as during problem solving research.
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Annex 5

(Socioeconomic) Principles by Dumont et al. (2016)

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- (1) Environmental equity (Environmental equity enhanced by taking the negative environmental externalities in each economic choice into account)
 - (2) Financial independence (Farmers and agricultural organizations are in control of the economic and technical decisions that they take, even if that means limiting the amounts of inputs used. This theme does not concern independence from the customers of the agricultural organization in question, which is considered a separate theme)
 - (3) Market access and autonomy (Access to and independence from markets for farmers and all collective production or processing structures)
 - (4) Sustainability and adaptability (Sustainability and adaptability of agricultural organizations stemming mainly from their inclusion in a network of farmers, consumers, technical advisors, and scientists)
 - (5) Diversity and exchange of knowledge (Traditional, empirical, and scientific knowledge is exchanged among the members of an organization)
 - (6) Social equity (Social equity among all the stakeholders on all levels of the food system)
 - (7) Partnership between producers and consumers (Partnership marked by the existence, whether formal or not, of a social contract between producers and consumers)
 - (7) Geographic proximity (Geographic proximity of the stakeholders in the various production, processing, and consumption phases)
 - (8) Rural development and preservation of the rural fabric (A food system's projects participate in rural development and preserving the social fabric)
 - (9) Shared organization (Organization by the farmers and/or actors of the processing steps in common)
 - (10) Limited profit distribution (The profits are used to reach a social goal and not just to maximize the return on the capital invested)
 - (11) Democratic governance (The power of an organization's members is not based on their capital; decisions are made democratically)
 - (12) Joint implementation of the various principles in actual practice (The principles that an organization defends must be implemented together rather than separately)
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Annex 6

The 10 Elements of Agroecology (FAO 2018a)

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- (1) Diversity
 - (2) Synergies
 - (3) Efficiency
 - (4) Resilience
 - (5) Recycling
 - (6) Co-creation and sharing of knowledge
 - (7) Human and social values
 - (8) Culture and food traditions
 - (9) Responsible governance
 - (10) Circular and solidarity economy
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